Monte Carlo Dynamics of Randomly Branched Polymers in a Good Solvent

Z.Y.J. Chen

Department of Physics

University of Waterloo

Waterloo, Ontario, Canada N2L 3G1

J. Kemp
Department of Physics
McMaster University
Hamilton, Ontario, Canada L8S 4M1

Monte Carlo simulations based on the bond fluctuation model were carried out to study the dynamics of randomly branched polymers in a good solvent. Initial branching *structures* were constructed according to the same model and then frozen. The Rouse dynamics of the molecule with a particularly branching structure was studied by observing various time dependent correlation functions. For each given number of monomers, five independent sample branching structures were produced for the study in order to take into account the variations in structures. We characterized the dynamics by using various relaxation times. Two types of time scales were observed: the fast relaxation times corresponding to the internal contraction motions, and the slow relaxation times corresponding to the overall rotational and diffusive motions. The former is associated with autocorrelation functions that exhibit non-exponential decaying behavior, a signature of the dynamics of *random* systems. The latter is associated with the usual exponential decaying behavior, a normal property for linear or regularly branched polymers. The relaxation times as functions of number of monomers were determined and empirical scaling laws of these relaxation times will be discussed.